

In the Matter of

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IB Docket No. 18-86

## I. INTRODUCTION AND SUMMARY

SES Americom, Inc. and its subsidiary O3b Limited (collectively, “SES”) respectfully submit these reply comments in response to the Federal Communication Commission’s Notice of Proposed Rulemaking (“NPRM”) in the above-captioned proceeding, regarding streamlining licensing procedures to facilitate the deployment of small satellites.<sup>1</sup>

SES applauds the Commission's effort to improve the regulatory hurdles faced by small satellites with respect to licensing and application procedures. There is broad consensus on the Commission's identification of characteristics of small satellites or systems that would qualify for streamlined processing, and SES generally supports the Commission's proposed framework. The Commission's basic streamlining proposals – to consider for streamlined processing applications of up to 10 satellites, to limit such systems to a five-year term, and to begin the

<sup>1</sup> *Streamlining Licensing Procedures for Small Satellites*, Notice of Proposed Rulemaking, FCC 18-44 (Apr. 17, 2018) (“*NPRM*”).

relevant license term once one satellite has been placed into its authorized orbit and with a modified bond requirement – all appropriately reduce the regulatory burden of licensing smaller-sized satellites with intended short duration missions which will share with and not preclude other operations in a particular frequency band. Proposed rules that help ensure protection of incumbent satellite operations – such as trackability via a unique telemetry marker, submission of Form 312 and Schedule S that enable technical analysis, and requirements for maneuverability – are also important elements of any streamlined processing of smallsat applications.

However, SES urges the Commission to continue to apply certain key elements of the existing satellite application processing framework to streamlined processing for smallsat applicants. The Commission should maintain its rule limiting the number of unbuilt NGSO-like systems attributable to a single applicant, as a measure that will maintain the intended limited scope of streamlined processing. While SES does not object to retaining the current Section 25.207 formulation to allow greater flexibility in ceasing transmissions as required, SES does not support a further requirement that prohibits transmissions absent an active command, to the extent it would require permanent cessation of transmissions. Lastly, any list of frequency bands to be accessed under the streamlined processing framework should not include bands with typical NGSO FSS, MSS, or other operations requiring full-time uninterrupted availability of assigned spectrum.

## **II. THE COMMISSION’S RULES SHOULD ENABLE STREAMLINED PROCESSING FOR SMALL SATELLITE SYSTEMS WITH SHORT DURATION MISSIONS THAT PROTECT EXISTING AND FUTURE OPERATIONS IN A GIVEN FREQUENCY BAND**

In proposing a regime for streamlined processing for small satellites, the Commission contrasted large commercial constellations of smaller-sized satellites envisioned to operate over

an extended period with operations of fewer small satellites with intended short duration missions. The Commission's streamlining proposal is intended for the latter constellations, and SES generally supports this framework as appropriate for this limited purpose.<sup>2</sup> The NPRM emphasizes that its Part 25 rules are not necessarily tailored to address small satellites that are part of small-scale operations, including commercial operations, and that its proposed framework would ideally reduce time spent by both applicants and the Commission consistent with the short mission lifetimes of many small satellites.<sup>3</sup> SES generally supports the proposed framework as adapting the Commission's processes commensurate with the scope of short duration small satellite missions.<sup>4</sup>

*Number of Spacecraft.* SES supports the proposed limitation of 10 satellites to qualify for streamlined processing of a small satellite license, as well as the retention of Section 25.159(b) the Commission's rule limiting the number of unbuilt NGSO-like systems attributable to a single applicant. Commenters generally support this number.<sup>5</sup> SES concurs with the Commission's assessment that permitting streamlined processing for up to 10 satellites appropriately targets short duration missions consistent with experience with smallsats to date.<sup>6</sup> SpaceX notes that it is also important that no party be permitted to file multiple applications in a way that effectively permits creation of a substantial NGSO constellation.<sup>7</sup> SES agrees with SpaceX that the Commission should retain its limitation on unbuilt NGSO-like systems to ensure that

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<sup>2</sup> See *id.* ¶ 13.

<sup>3</sup> See *id.* ¶ 21-22.

<sup>4</sup> See NPRM at ¶ 27 (The Commission notes that the process is "intended for a limited group of applicants whose operations are small enough in scope that it would not serve the public interest to apply certain of our standard Part 25 procedures.")

<sup>5</sup> See *e.g.*, Echostar Comments at 7; SpaceX Comments at 7.

<sup>6</sup> See NPRM at 25 (The Commission's goals for this process include "enabling faster review of applications by the Commission in order to facilitate the deployment and operation of small satellites that can advance research missions and support services such as the provision of Earth observation data.")

<sup>7</sup> See SpaceX Comments at 7-8.

deployments authorized using streamlined procedures will conform to the scale of operations intended by the Commission in its proposal.

*License Term.* Multiple commenters support the Commission's proposal to issue grants for a five-year license term as an appropriate total on-orbit lifetime for small satellites that would be eligible for the streamlined process.<sup>8</sup> SES agrees that this is an appropriate license term for satellites with short duration missions, and supports the Commission's proposal that the license term for the satellites covered by each small satellite license would begin once one satellite has been placed into its authorized orbit rather than at the time of license grant. CSSMA seeks flexibility to extend this term to enhance the commercial viability of systems that might not complete all associated launches within the five-year term, either due to launch delays or launch anomalies.<sup>9</sup> However, the commencement of the license term at launch ensures that licensees have a full five years to secure and complete launches for a total of 10 satellites. This delay beyond the traditional start of a satellite license term will allow small satellite systems sufficient time to de-orbit satellites operating on the type of short-duration missions that the streamlined process is intended to address. SES agrees with Boeing that a five-year term will create strong incentives to limit the size and number of such systems to only what is necessary to accomplish the mission goal.<sup>10</sup>

*Deployment Orbit and Maneuverability.* The Commission's proposal to require active maneuvering capability for smallsats deployed above 400 km is based on the view that limited maneuvering capabilities (such as those relying primarily on drag) would be insufficient to support deployment at the higher altitudes under a streamlined small satellite process, as such

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<sup>8</sup> See e.g., SpaceX Comments at 4; Boeing Comments at 10.

<sup>9</sup> CSSMA Comments at 11-12.

<sup>10</sup> Boeing Comments at 10.

methods would require closer Commission review. Several commenters urge some greater degree of flexibility, suggesting that new technologies with improved maneuverability either are already or will be imminently available, and that smallsat applicants should be allowed to offer demonstrations that the techniques that they propose to employ (potentially including drag) are adequate to enable responsive maneuvers.<sup>11</sup> SpaceX, by contrast, argues that an applicant for streamlined processing should certify that its satellites have sufficient propulsion capabilities to perform collision avoidance maneuvers – regardless of deployment altitude – citing the dangers to deployment of spacecraft that transit through the sub-ISS altitudes, such as scientific missions, manned missions to ISS and space tourism.<sup>12</sup>

SES supports the Commission’s proposal to require active maneuvering capability for smallsats deployed above 400 km as appropriate for purposes of streamlined processing. Any new technologies for or alternatives to active maneuvering capability will indeed require closer review by the Commission. Other satellite operators will similarly need to expend time and resources on assessing the efficacy of any alternative means of collision avoidance with respect to their own operations. Given the additional burdens inherent in this evaluation, streamlined processing is not an appropriate venue for consideration of alternative means for collision avoidance.

*Trackability.* The Commission proposes that applicants for streamlined processing certify that the satellite will include a unique telemetry marker allowing it to be readily distinguished from other satellites or space objects. SES supports this proposal and the emphasis

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<sup>11</sup> See e.g., Boeing Comments at 12; Phase Four Inc. at 2.

<sup>12</sup> See e.g., SpaceX Comments at 9-10.

by other commenters on the importance of trackability under streamlined processing.<sup>13</sup> SES would further support use of a passive or an active identifier, such as the International Designator used upon registration of a satellite, for satellites qualifying for streamlined processing.

*Cessation of Emissions.* The Commission proposes to ensure the reliability of a satellite's ability to cease transmissions instantaneously by requiring a certification that the satellite has the ability to receive command signals and cease transmissions as a result of a command.<sup>14</sup> The Commercial SmallSat Spectrum Management Association ("CSSMA") effectively rejects this proposal, arguing that existing requirements under Section 25.207 of the rules – that satellites be capable of ceasing radio emissions by the use of appropriate devices (battery life, timing devices, ground command, etc.) – are adequate and a more flexible requirement than the Commission's proposal. The Commission further asks whether such applicants should be required to employ a "passively safe" system, i.e., the satellite cannot transmit unless it is actively commanded to transmit via a command and will cease transmission unless within view of a ground station.<sup>15</sup>

SES does not object to retaining the current Section 25.207 formulation to allow greater flexibility in ceasing transmissions as required. However, SES does not support a further requirement that prohibits transmissions absent an active command, to the extent it would require permanent cessation of transmissions. Such a change implies that cessation would mean permanent passivation, which would not allow for recovery over time in the event of an anomaly. It is more important to know that under any failure mode, satellite will cease

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<sup>13</sup> See e.g., Boeing Comments at 13; EchoStar Comments at 5 (smallsats should be "trackable from the ground by active means."); SpaceX Comments at 6-7.

<sup>14</sup> See NPRM ¶ 40.

<sup>15</sup> *Id.*

transmission after a certain period. The Commission's proposed re-formulation of Section 25.207 is not appropriate because it would not allow for this possibility.

*Application Requirements.* While commenters generally support the Commission's proposal that FCC Form 312 and Schedule S continue to serve as the basis for smallsat applications under the streamlined small satellite process,<sup>16</sup> the CSSMA urges the Commission not to require that streamlined processing applicants submit specific orbital deployment parameters and antenna gain contour plots in the Schedule S. CSSMA notes that smallsats procure launches on an opportunistic basis and that the altitude of non-station-kept smallsats will lower over time, making it unnecessary and burdensome to submit antenna gain contour plots in Schedule S for all possible inclinations and orbital altitudes. CSSMA proposes instead that applicants lacking station-keeping ability be permitted to submit a range of deployment altitudes and inclinations, and that all applicants submit a worst-case representative antenna gain contour plot for each antenna.

The Commission should retain its proposed requirement for submission of all relevant data required in the Schedule S for streamlined smallsat applications, including orbital parameters and antenna gain contour plots. In order to perform the radiofrequency analysis necessary to evaluate the interference potential of an NGSO-like constellation, an application must include detailed data on the probability and magnitude of interference, which is in turn dependent on the orbit and antenna performance. Particularly for non-station-kept systems, the intended orbit and antenna performance with adequate technical detail and appropriate interference analyses must be conducted. It is also possible that parameters as submitted in an

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<sup>16</sup> See e.g., SIA Comments at 2; EchoStar Comments at 8.

application will deviate from those recorded after launch, at which time an amendment may be appropriate and further analysis should be conducted. In sum, submission of a single worst-case representative antenna gain contour plot will not provide sufficient data to allow other satellite operators, which operate a range of NGSO-like as well as GSO systems, to adequately assess these probabilities.

### **III. OPERATIONS OF SMALL SATELLITES UNDER STREAMLINED PROCESSING SHOULD BE LIMITED TO FREQUENCIES APPROPRIATE FOR SHARING**

*Frequency Considerations for Small Satellites.* The Commission seeks comment on whether it should include a non-exclusive list of frequencies in Section 25.202 of the Commission's rules in order to assist small satellite operators in identifying possible frequency bands for use, and whether the proposed streamlined process should be limited to specific frequency bands. SES shares views expressed by SpaceX and the Commercial Spaceflight Federation that small satellite operators would benefit from guidance provided by the Commission but also from flexibility among available frequency bands.<sup>17</sup> This frequency list, however, should not include bands with typical NGSO FSS, MSS, or other operations requiring full-time uninterrupted availability of assigned spectrum.

As SpaceX highlights and the Commission acknowledges, there is a limited or nonexistent ability to share spectrum with all existing and future operations of these services, which are more appropriately addressed for authorization under existing Part 25 procedures.<sup>18</sup> SES agrees with SpaceX that the Commission should publish a non-exclusive of frequencies available for smallsat use in Section 25.202 as guidance, and that the Commission should also provide a list of

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<sup>17</sup> See e.g., Commercial Spaceflight Federation Comments at 7; SpaceX Comments at 11-12.

<sup>18</sup> See e.g., SpaceX at 11; NPRM ¶ 45.



frequencies that have been or are currently the subject of a Part 25 processing round. Such a list must also include, however, frequencies in which operations of GSO as well as NGSO systems require full-time uninterrupted availability of assigned spectrum, as some GSO bands are also not suitable for streamlined processing of smallsat applications.

The Commission asks whether additional frequencies (beyond those specifically addressed in the NPRM) should be identified for use by smallsats for inter-satellite links, whether definitions of MSS, FSS, or ISS should be altered to facilitate use by smallsats, and whether additional technical requirements should be adopted to facilitate use of MSS and FSS for inter-satellite links.<sup>19</sup> Such considerations are premature for frequency bands used by typical NGSO FSS, MSS, or other operations requiring full-time uninterrupted availability of assigned spectrum, and in any event are not appropriate for such bands for purposes of considering smallsat operations on a streamlined basis. As EchoStar notes, there is no assessment in the record of the potential impact on GSO or other NGSO operations of use of MSS or FSS frequencies for smallsat inter-satellite links.<sup>20</sup> For example, transmissions from LEO at 400 km or MEO at 8000 km would imply higher signal strength at satellite receivers at GSO or at any NGSO higher than a smallsat inter-satellite transmission. Further analysis would be required before permitting satellites at LEO to transmit to satellites at higher altitudes, whether at NGSO or GSO, in order to ensure the appropriate conditions for protection from smallsat inter-constellation links. Nor is there sufficient analysis on the record of compliance of these unconventional smallsat links with EPFD  $\uparrow$  limits for protection of the GSO arc. A proliferation

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<sup>19</sup> See *NPRM* ¶ 72.

<sup>20</sup> See *EchoStar Comments* at 6-7.

of such use without studies would, as SpaceX notes, complicates an already challenging NGSO-to-GSO and NGSO-to-NGSO coordination environment.<sup>21</sup>

#### **IV. THE COMMISSION SHOULD UPHOLD ITS BOND REQUIREMENT, WITH REVISIONS AS PROPOSED FOR SMALL SATELLITES**

The Commission should uphold its longstanding precedent of imposing bond requirements that are normally applicable to NGSO satellites under Part 25. The Commission has already accounted for potential challenges faced by small satellites by proposing a one-year “grace period” beginning 30 days after license grant, during which small satellites would not have to post a bond.<sup>22</sup>

SES disagrees with CSSMA’s proposal that any bond requirements, including the Commission’s one-year grace period, should be eliminated. CSSMA argues that “the allocation of spectrum on a non-exclusive, non-first-come, first-served basis through the Streamlined Process is sufficient to mitigate any spectrum warehousing concerns.”<sup>23</sup> However, CSSMA also advocates for protection consistent with the Table of Frequency Allocations, in other words, it argues that applications under streamlined process should have access to spectrum and orbital resources with equal status to operations of traditional Part-25 licensed satellite services.<sup>24</sup> A bond is warranted where, as here, the applicant will seek protected access to spectrum and orbital resources which may conflict with and must at a minimum be coordinated with other operators.

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<sup>21</sup> SpaceX Comments at 12-13. (“SpaceX ... does not support the use of FSS frequency bands for ... inter-satellite communications. FSS spectrum is already heavily subscribed, both by established GSO systems and by the emerging generation of NGSO constellations that promise to bring an even higher level of broadband services to all Americans. Authorizing an ever-changing assortment of smallsats to operate inter-satellite links using FSS spectrum would further complicate the already challenging coordination environment for NGSO operators with GSO and other NGSO systems.”)

<sup>22</sup> See *NPRM* ¶ 50.

<sup>23</sup> *Id.*

<sup>24</sup> See CSSMA Comments at 30, 40 (“[S]mall satellite operations should have the same status as MSS operations in the particular frequency band.”).

Therefore, SES urges the Commission to uphold its longstanding precedent of imposing bond requirements on NGSO systems by maintaining a bond requirement for small satellites.

## **V. CONCLUSION**

SES applauds the Commission's efforts to create a streamlined licensing process for small satellites and urges the Commission to strike a careful balance between easing the regulatory burdens faced by new small satellite entrants in the streamlined process and protecting current NGSO and GSO satellite systems.

Respectfully submitted,

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